which ultimately serve as the starting place for the coil of cilia in each antherozoid, are regarded as organs *sui generis;* and although their possible relation to centrosomes is also considered, the arguments against their identity with the latter are cogent. In fertilisation, the entire antherozoid enters the egg, and the cytoplasm and nuclei of the male and female cells respectively become fused. No centrosomes were observed during the cleavage of the fertilised egg during the formation of the embryo.

WE have received from the publishers (Messrs. Cassell, Ltd.) a copy of the first part of an illustrated quarto work on "European Butterflies and Moths," by Mr. W. F. Kirby, the well-known lepidopterist. The plates are excellent examples of modern colour-printing, and the work, so far as it has yet gone, may be described as an attractive subject attractively treated. Perhaps it would have been better if a little more prominence had been given in the text to the English names. The work is to be issued in fortnightly parts.

A VOLUME containing the physical papers of the late Prof. H. A. Rowland is now in preparation. It will be issued under the editorial direction of a committee appointed for that purpose, consisting of President Remsen, Prof. Welch and Prof. Ames. The book will contain Prof. Rowland's articles and memoirs on physical subjects, together with his popular writings and addresses, numbering sixty in all. It will occupy between six and seven hundred pages, and will be published at the price of one guinea net per copy. Orders may be sent to Prof. Joseph S. Ames, secretary of the committee of publication, Johns Hopkins University, Baltimore, Maryland.

THE industry of chemical perfumes is one of recent development and is rapidly assuming an importance second only to the colour industry in the field of commercial organic chemistry. The current number of the *Moniteur Scientifique* contains an account by MM. Marc Tiffenau, R. Bernard and A. Gloess of the exhibits in this field at the Paris Exhibition of 1900, preceded by a short sketch of the general methods employed in the preparation of chemical perfumes. It is interesting to note that practically the whole of this branch of applied science is divided between two nations, France and Germany.

THE conclusion of Maxwell from the electromagnetic theory of light that the dielectric capacity should be equal to the square of the refractive index has led to a mass of experimental work not always in accord with the law. In the current number of the *Comptes rendus*, M. Edm. van Aubel collects the experimental data for these two constants for four classes of nitrogen compounds, amines, alkyl nitrates, fatty nitro-derivatives and nitriles, and shows that in all cases the dielectric constant diminishes as the molecular weight increases, whilst the refractive index increases, a result obviously incompatible with Maxwell's law.

THE additions to the Zoological Society's Gardens during the past week include two Lesser Kestrels (*Tinnunculus cenchris*), a Short-eared Owl (*Asio brachyotus*) captured in the Red Sea, presented by Capt. E. W. Burnett; a Red-footed Falcon (*Tinnunculus vespertinus*), South European, presented by Miss E. Leeke; a Virginian Eagle Owl (*Bubo virginianus*) from the West Indies, presented by Mr. B. C. Storey; a Common Mynah (*Acridotheres tristis*) from India, presented by Mr. F. G. Miéville; two Syrian Bears (*Ursus syriacus*) from Western Asia, twenty-two Moorish Toads (*Bufo mauritanica*) from North-west Africa, five Amphiumas (*Amphiuma means*), ten Punctated Newts (*Amblystoma punctatum*) from North America, an Upland Goose (*Chloephaga magellanica*) from the Falkland Islands, received in exchange; a Japanese Deer (*Cervus sika*) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

NEW VARIABLE STARS.—The following variable stars have been detected on plates taken with the astrographic telescope at Greenwich Observatory:—

Star.	R.A.			Decl.		Variation.	
	h.	m.	s.	°	′	m.	m.
6. 1902. Draconis ...	18	5	9 ...	+65	56·9 ...	9·0 –	<14
7. 1902. Draconis ...	18	6	54 ...	+66	8·9 ...	9·5 –	14
8. 1902. Camelopardalis	5	49	22 ...	+74	30·8 ...	8·9 –	<14

ELEMENTS OF COMET 1902 *a* (BROOKS).—The following elements computed for this comet are given in *Astronomische Nachrichten*, Bd. 158, No. 3790:—

$$T = 1902 \text{ May } 7{\cdot}159, \text{ Berlin M.T.}$$

$$\left.\begin{aligned} \omega &= 228^\circ\ 22'{\cdot}7 \\ \Omega &= 52\ \ 15{\cdot}4 \\ i &= 66\ \ 30{\cdot}4 \end{aligned}\right\} 1902{\cdot}0.$$

$$\log q = 9{\cdot}65436.$$

COLABA OBSERVATORY.—The Report of the Director of the Government Observatory at Colaba, Bombay, has been issued, and contains the results of magnetic and meteorological observations made during the year 1901.

The magnetic observations have been on regular record since 1842, but there is now reason to believe that disturbances will occur from the proximity of the electric tramways in Bombay. It is hoped, however, that a new site will be granted early enough to permit of a fresh series of determinations running parallel with the present, so that the value of such a long continuous record may not be seriously affected.

ATOMS AND VALENCIES.

AN offprint has come to hand of a thoughtful essay by Mr. J. Fraser, of the Scottish Ordnance Survey, entitled "A Theoretical Representation leading to Suggestions bearing on the Ultimate Constitution of Matter and Ether," which appeared recently in *Proc.* Roy. Soc. Edin. xxiv., i., 1902, pp. 1–64. Under this guarded title the writer discourses, in a manner often stimulating and suggestive, on the bearing on the facts of chemistry and chemical physics of a notion he has formed of the constitution of the æther, and of matter which he considers as constructed out of that medium. He begins by quoting Sir J. Herschel's opinion that the æther is "an adamantine solid," far denser, in fact, than the densest metal. The other alternative, that of inertia or density insensibly minute, has been more commonly in evidence in recent times, especially since Lord Kelvin showed that it was adequate for the transmission of radiant energy across space. It is something to know that the more unfamiliar view, which has recently again been broached in illustration of the laws of general æther-theory, presented no intrinsic difficulty to the mind of so competent an authority as Herschel. Enormous density implies still more enormous elastic resistance, which Mr. Fraser ascribes in a way to a kinetic origin, like Kelvin's and FitzGerald's turbulent motion. How is an atom of matter to be represented? Briefly and bluntly, in the words of the writer, as "a veritable ethereal bubble"—walled in by a single layer of æther-particles, in very rapid rotation, the centrifugal force of which prevents the bubble from collapsing under the enormous ambient pressure. How is its permanence assured? Astronomical analogies are invoked in favour of its possibility; but the sceptical critic had better refrain from too close scrutiny in order to pass on to see whether any light on atomic behaviour is shed by a somewhat loose representation of this sort. After all, a hollow vortex-ring atom is a ring-shaped bubble kept open much in this way; and representations dynamically vaguer than this have turned out in chemical science to contain the germ of fruitful and far-reaching progress. A sort of Le Sage corpuscular theory of gravity is set forth with considerable freshness and some plausibility. But the most interesting sections relate to chemical suggestion, with regard to which the writer modestly confesses to little knowledge except what has been acquired with a view to the present attempt. It may be remarked on his behalf that knowledge of speculative scientific theory, when acquired with some constructive intention of this sort, even if it be visionary, is apt to be a much more real possession than when the aim is merely to become well-informed in a colourless way about the opinions that

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chemists have held and have at different times put into their treatises. Time and reflection, to an extent that can hardly be spared by most people, would be required to come to a definite judgment as to how far the notions put forward are allowable or should be at once put aside, whether the "resemblance to the ways of nature" on which the writer insists involves any germ of general ideas beyond those already recognised. But in any case there can be no question as to the acuteness of the writer; and the Royal Society of Edinburgh has been well advised in making his ideas accessible to others who are attracted by the same range of theoretical speculation, in subjects which are only now coming to the threshold of the dynamical stage.

J. L.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The subject of the Rede lecture, to be given by Prof. Osborne Reynolds, F.R.S., on June 10, at 11.30 a.m., is "On an Inversion of Ideas as to the Structure of the Universe."

Prof. Forsyth, F.R.S., will represent the University at the celebration of Abel's centenary, to be held at Christiania in September, 1902.

The museums syndicate propose to assign the greater portion of the buildings about to be vacated by the botanical department to the engineering laboratory. The number of the students engaged in the latter is now more than 200, and extension of the accommodation now provided is urgently necessary. The syndicate regret that they are unable to make arrangements for additional accommodation for the departments of human anatomy and physiology, or for the museum of zoology, which are also in need of considerable expansion.

The Graces authorising the recently proposed changes in the natural sciences tripos will be voted on in the senate on May 22. It is understood that some of them will be opposed.

Mr. W. Bateson, F.R.S., is again to be deputed to lecture in zoology for Prof. Newton during the ensuing academical year.

The Frank Smart studentship in botany will be vacant at midsummer. The studentship is of the annual value of 100*l.* and is intended to further the scientific study of botany by supplying students with some means of pursuing original investigations in this subject after they have taken the degree of Bachelor of Arts. It is open to all students of the University who have taken honours in the first part of the natural sciences tripos, provided that not more than fourteen terms have elapsed since their first term of residence. The studentship is not awarded by a competitive examination. Candidates should send in their names to the master of Gonville and Caius College on or before June 10, with a statement of their University standing.

THE second reading of the Education Bill was passed by the House of Commons on Thursday, May 8, after a debate which extended over three days. The majority in favour of the second reading was 237, the numbers being 402 votes for the Bill and 165 against.

TO assist the scholarship scheme founded by the late Mr. Rhodes, Sir Alfred Jones, head of the shipping firm of Elder, Dempster and Co., announces that he will agree to give a free passage backwards and forwards from any colonial port served by his firm's steamers to both Jamaican and Canadian scholars once a year during the tenure of their scholarships. He adds:—"I trust that my example will be followed by shipowners trading to other colonies, and I hope that it may thereby be made universal, so as to put all the Rhodes scholarships from the colonies on an equal footing."

THE announcement is made that Prof. Karl B. Lehmann, of Würzburg, has been appointed to the chair of hygiene at the University of Munich, which recently became vacant by the death of Prof. Hans Buchner on March 30. He was formerly connected with the University, having been trained there as a medical student, and subsequently acted as assistant to Prof. Pettenkofer and as privat-docent for many years. Prof. Lehmann, who is a Swiss by birth, is still in the prime of life, but has already made a high reputation as a hygienist. His first special scientific work was the study of the physiology of the sense-organs, his contributions to this department of science being of great and practical value. He has also studied and written upon the action and influence of various gases upon the animal organism, and more recently has given much attention to the study of physiological chemistry in connection with general metabolic processes.

IN connection with the subject of State aid for secondary education, it is of interest to read in *Science* that the General Assembly of the State of Iowa has passed a mill tax for the building support of the three educational institutions of Iowa, as follows:—State University at Iowa City, one-fifth of a mill to run for five years. This will realise 550,000 dollars. The Iowa State College of Agriculture and Mechanic Arts at Ames, one-fifth of a mill for a similar period, which will realise 550,000 dollars. The State Normal School at Cedar Falls, one-tenth of a mill for five years, which will realise 225,000 dollars. The State educational institutions receive in addition 434,269 dollars for the biennial period, distributed as follows:—State University, 215,000 dollars; Iowa State College of Agriculture and Mechanic Arts, 135,000 dollars—of this 35,000 dollars are for additional general support annually, and 10,000 dollars annually for the experiment station, 5,000 dollars for live stock, 5,000 dollars to begin the building of a barn, and 35,000 dollars to start a main central building; the Iowa State Normal School, 84,269 dollars.

THE general scope of the new matriculation examination for all students of the University of London are published in the official gazette. The full text of the regulations will be published at the beginning of June, and the first examination under them will commence on September 15 next. An examination under the old regulations will be held in January, 1903, and under both sets of regulations in June, 1903. Matriculation candidates will be expected to show a competent knowledge in each of the following subjects, according to the details specified under the several heads:—(1) English, one paper of three hours. (2) Elementary mathematics, two papers of three hours each. (3) Latin, or elementary mechanics, or elementary physics (heat, light and sound), or elementary chemistry, or elementary botany, one paper of three hours in each subject. (4) Two of the following subjects, neither of which has already been taken under (3). One paper of three hours in each subject. If Latin be not taken, one of the other subjects selected must be another language from the list, either ancient or modern:—Latin, Greek, French, German, Arabic, Sanskrit, Spanish, Portuguese, Italian, Hebrew, history (ancient or modern), logic, physical and general geography, geometrical and mechanical drawing, mathematics (more advanced), elementary mechanics, elementary chemistry, elementary physics—(*a*) heat, light and sound, or (*b*) electricity and magnetism; elementary biology—(*a*) botany, or (*b*) zoology.

DR. D. C. GILMAN contributes to the May number of *Scribner's Magazine* some further reminiscences of noteworthy scholars with whom he has been brought in contact as president of the Johns Hopkins University. An English mathematician remarked to him one day that he had heard of Baltimore as a place which exported corn and imported mathematics, and this epigram was founded upon fact. Cayley and Sylvester both went to the new University from England. Cayley spent a winter at Baltimore, and profoundly impressed his hearers; Sylvester spent the seven years there which preceded his seventieth birthday, and left to become Savilian professor at Oxford. Many stories are told of Sylvester's eccentricities, but most of them are apocryphal. He became possessed of a sort of monomania for rhyme, and one of his most extraordinary compositions was a long series of lines, every one of which ended with a syllable that he pronounced as *ind.* This *tour de force* reached four or five hundred verses. Sometimes he was very absent-minded. For example, he arrived from Philadelphia in a late train one night and walked bareheaded to his hotel. The next morning he demanded his hat, and insisted that it was in the house, and he would not be persuaded that it had not been stolen until a telegram revealed the fact that the hat had been found in the train at Washington. In 1884, Lord Kelvin gave a course of lectures at the University. "The lectures," says Dr. Gilman, "went on from day to day upon the topics that occurred to the lecturer, or that were suggested by the questions of his hearers. Everyone who was capable of following him was enchanted. , 'How long will these lectures continue?' asked one of the audience. 'I do not know,' replied Lord Rayleigh, who was one of the

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